

A meta-analysis of isotopic compositions of North Sea marine mammals

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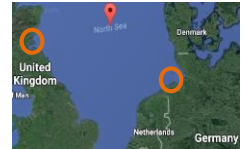
General framework

- Increase of strandings in the North Sea
 - **Increase** of marine mammal populations
 - **Human impact**
 - ➔ **Competition** for food resources?



Methods

- Sampling of grey seals, harbour seals & harbour porpoises
 - *Institute for Terrestrial and Aquatic Wildlife Research (ITAW)* - Germany
 - *Sea Mammal Research Unit (SMRU)* – Scotland - Isle of May
- Analyses of whole blood and muscle
 - Stable isotopes $\delta^{13}\text{C}$ (indication of the primary production), $\delta^{15}\text{N}$ (indication of the trophic level), $\delta^{34}\text{S}$ (inshore vs. offshore) ➔ EA-IRMS
 - SIBER model



Results & Discussion

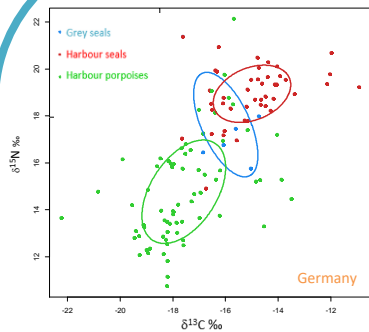


Fig 1 : SIBER model Standard Ellipses (SE) for the 3 species in Germany

- **No overlapping** (Fig.1) ➔ **No competition**
- **Lower trophic level** of **harbour porpoises** ($\delta^{15}\text{N} = 15.5 \text{ ‰}$) (Fig.1)
- **Same trophic level** for **grey seals** ($\delta^{15}\text{N} = 17.9 \text{ ‰}$) and **harbour seals** ($\delta^{15}\text{N} = 18.4 \text{ ‰}$) (Fig.1)

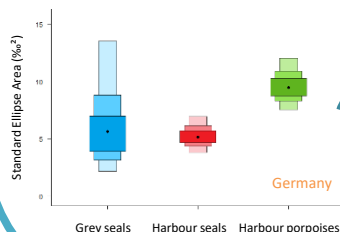


Fig 2 : Standard ellipse area (‰²) from SIBER model Standard Ellipses (SE) for the grey seals, harbour seals and harbour porpoises

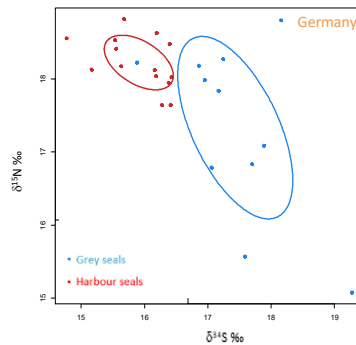


Fig 3 : SIBER model Standard Ellipses (SE) for the 2 species of seals in Germany

Grey seals :
 $\delta^{34}\text{S} = 17.4 \text{ ‰}$ (Fig.3)
➔ **Offshore diet and habitat**

Harbour seals :
 $\delta^{34}\text{S} = 15.9 \text{ ‰}$ (Fig.3)
➔ **Inshore diet and habitat**

Harbour porpoises :
Large ellipse size (Fig.2)
➔ **Opportunist diet**



Fig 4 : SIBER model Standard Ellipses (SE) for the grey seals of Germany and Scotland

Grey seals - Scotland :
 $\delta^{34}\text{S} = 16.6 \text{ ‰}$ (Fig.4)
➔ **Inshore diet and habitat**

Grey seals - Scotland :
Small ellipse size (Fig.5)
➔ **Specific diet and habitat**

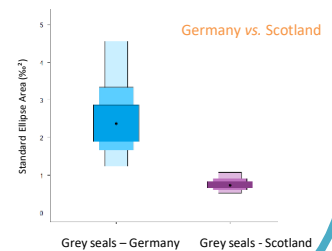


Fig 5 : Standard ellipse area (‰²) from SIBER model Standard Ellipses (SE) for the grey seals of Germany and Scotland

TAKE HOME MESSAGE

- **No competition** for food resources in the southern bay of the North Sea

Harbour porpoises : Opportunist diet

Grey seals of Germany : Larger foraging area ➔ Offshore

Harbour seals of Germany & Grey seals of Scotland : Specific diet and foraging area ➔ Inshore

NEXT STEP : Adding trace metals and mercury concentrations as biomarkers

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